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January 6, 2023

VIA VIS ECF

Hon. Edward M. Chen
U.S. District Court–Northern District of California
450 Golden Gate Avenue, Courtroom 5
San Francisco, California 94102

Re: *In re Tesla Inc. Securities Litigation*, No. 3:18-cv-04865-EMC (N.D. Cal.)

Dear Judge Chen:

Defendants write to respectfully request leave to file a short *Daubert* motion concerning Professor Steven Heston's new methodology for calculating options damages and Dr. Michael Hartzmark's implementation of it.

On September 20, 2022, Defendants filed a motion to exclude certain opinions of Heston and Hartzmark regarding the calculation of options damages. (ECF No. 479.) Defendants' motion was premised on Heston's use of an "impact quantum" methodology. (ECF No. 515-1, Ex. A ¶¶ 163, §6.3.) Among other bases, Defendants argued that Heston's impact quantum methodology, and Hartzmark's implementation of it, was unreliable because it did not compare actual Tesla option prices to but-for prices. (ECF No. 479 at 2-5.) On October 25, 2022, "during the pretrial conference Plaintiff agreed to rerun the stock option calculations using actual option price data instead of theoretical prices." (ECF No. 508 at 37:1-2.) On this basis, the Court rejected Defendants' *Daubert* argument as moot. (*Id.* at 51:7-11.)

Plaintiff served Heston's Second Supplemental Report on December 27, 2022. (ECF No. 527-1, Ex. A at 12-13.) The Report did not just implement the change permitted by the Court, but switched from an "impact quantum" methodology to an "out-of-pocket" methodology. (*Id.*, Ex. D at 23:13-23 ("I would say that *the two methodologies I proposed* are both reasonable, and given comparable inputs, would produce reasonably similar numbers.") (emphasis added).) On December 31, 2022, Plaintiff served Hartzmark's Supplemental Report, which attached "updated calculations" of options damages under Heston's new methodology. *(Id.,* Ex. A at 5; *id.*, Ex. C.)

Importantly, although comparing actual transacted option prices with but-for prices may be a step in the right direction, it is not the case that *any* comparison of actual option prices to but-for prices is reliable. Defendants have never had the opportunity to explain to the Court why Plaintiff's simplistic comparison of actual option prices with but-for prices, *without more*, is fundamentally unreliable and would award damages unrelated to Mr. Musk's tweets. Heston himself identified a fundamental problem with this *ad hoc* change: "If I measured impact as the difference between a unique but-for price and an actual transaction price, then the impact would vary based on where the

actual transaction fell within the bid-ask spread. . . . Therefore, it is important to account for . . . the fact that trades are exercised within a bid-ask spread. ***Applying a simple but-for option price would . . . erroneously show larger losses for people who paid closer to the bid price, and lower losses for someone who transacted closer to the ask price***." (ECF No. 515-1, Ex. A ¶¶ 181-182 (emphasis added).) In other words, any comparison of actual and but-for prices must account for the fact that investors traded at different prices for reasons unrelated to Mr. Musk's tweets. For example, if the but-for price of a call option is $30 and Investor A paid $40 trading through a sophisticated broker, while Investor B paid $50 online, there is no basis for Defendants to pay Investor B $10 more because he traded less efficiently.

As problematic, Hartzmark is now plainly comparing apples to oranges. The implied volatility of actual trades varies by strike price. But Heston calculates but-for implied volatilities for at-the-money straddles using the Black-Scholes formula, which assumes the same implied volatilities across all strike prices. (Ex. A attached hereto at 119:15-21 (Q. "The Black-Scholes model differs from empirical or observed option prices in that Black-Scholes assumes constant implied volatilities across all strike prices and maturities, right? A. Across all strike prices.").) Hartzmark then uses these volatilities derived for only *one* strike price (at-the-money) to calculate but-for option prices for *all* strike prices. It is one thing for Heston to assume a constant rate of volatility when "measuring the impact quantum" because both sides of the equation ("re-fitted actual" and "but for") made the same assumption. (ECF No. 508 at 45:28.) But, in Heston's words, his new methodology now uses "different procedures" for each side of the equation. (ECF No. 527-1, Ex. D at 46:12.)

By failing to account for "the fact that trades are exercised within bid-ask spread," and making an assumption of constant implied volatility in the but-for world that does not apply to actual prices, Hartzmark arrives at precisely the "erroneous" results Heston describes. In fact, Hartzmark's new damage numbers are wildly different from his old ones and award damages on trades that previously had none and *vice versa*. Even worse, the new numbers are plainly absurd. For example, applying Heston's methodology exactly as Hartzmark does generates "damages" *even before Mr. Musk's first tweet*. As Exhibit B hereto shows, according to Heston and Hartzmark, someone who sold a Tesla call option with a January 2019 expiry and $405 strike price one minute before Mr. Musk's first tweet was damaged by approximately $4. Likewise, someone who bought a Tesla put option with a January 2019 expiry and $220 strike price one minute before Mr. Musk's first tweet was damaged by approximately $6, or 75% of the transaction price. Exhibit C hereto shows the same absurd phenomena for the last minute of the class period when there should be zero damages. How can a damages methodology designed to measure the impact of Mr. Musk's tweet possibly be reliable when it generates damages before the tweet even happened and after its effects are claimed to have dissipated? *See In re Apple iPhone Antitrust Litig.*, 2022 WL 1284104, at *7 (N.D. Cal. Mar. 29, 2022) (excluding expert damages methodology that "leads to absurd results").

These are just some of the disqualifying flaws in Heston's new methodology as implemented by Hartzmark. It is not possible to address them all within two pages. The reality is that, in a desperate attempt to save his options case, Plaintiff made an off-the-cuff suggestion that created further serious problems that Defendants have never had the opportunity to brief. In the interests of fairness, Defendants' request to file a short *Daubert* motion should be granted. *See Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 2016 U.S. Dist. LEXIS 190177, *2 (S.D. Cal. Apr. 4, 2016) (contemplating "renewed" *Daubert* motions because the parties were required to "generate updated damages expert reports").

Respectfully submitted,

/s/ Alex Spiro

Alex Spiro

cc: All counsel of record via ECF

Exhibit A

UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

Case No. 18-cv-04856-EMC

IN RE: TESLA, INC., SECURITIES LITIGATION :

DEPOSITION UNDER ORAL EXAMINATION OF:
STEVEN HESTON
March 16, 2022

REPORTED BY: JENNIFER L. WIELAGE, CCR, RPR, CRR

JOB # 12105

Q. Yes.
A. Right. And the implied volatility is literally defined in terms of the Black-Scholes Formula. So I think that illustrates the pervasiveness and the acceptance of the Black-Scholes model --
Q. Good.
A. -- that people have these terms and characterize options in terms of the Black-Scholes Formula such that any deviation is -- has a name. So these are the names they give it.
Q. I appreciate that you want to make that point, Professor. But you're not answering my question. Okay?
The Black-Scholes model differs from empirical or observed option prices in that Black-Scholes assumes constant implied volatilities across all strike prices and maturities, right?
A. Across all strike prices. The Black-Scholes-Merton -- the Merton implementation allows volatility to differ by expiration.
Q. And that assumption of constant volatility, across different strike prices and across different maturities, differs from what actually happens with traded options, right?

Exhibit B

Inflation Estimates Related to Direct Effect of Tweet Are Not Zero
for Transactions Occurring in Minute Prior to Start of Class Period
Call Options with January 2019 Expiry

Strike	Actual Transacted Price	But-For Option Price	Inflation
$100	$257.58	$257.93	-$0.35
$200	$161.87	$160.17	$1.70
$360	$44.40	$46.76	-$2.36
$380	$35.75	$38.75	-$3.00
$385	$34.00	$36.94	-$2.94
$390	$31.45	$35.21	-$3.76
$395	$29.75	$33.55	-$3.80
$400	$28.10	$31.95	-$3.85
$405	$26.45	$30.42	-$3.97
$450	$15.42	$19.35	-$3.93

Sources: CBOE Data.
Notes:
1. Actual Transacted Price is assumed to be based on the "Close" price in CBOE data at 12:47pm on August 7, 2018.
2. But-For Option Price is calculated using the Black-Scholes-Merton (BSM) option pricing formula using the price of Tesla stock at 12:47pm on August 7, 2018 and a But-For Implied Volatility of 48.97% (see Hartzmark Appendix 8).

Inflation Estimates Related to Direct Effect of Tweet Are Not Zero for Transactions Occurring in Minute Prior to Start of Class Period Put Options with January 2019 Expiry

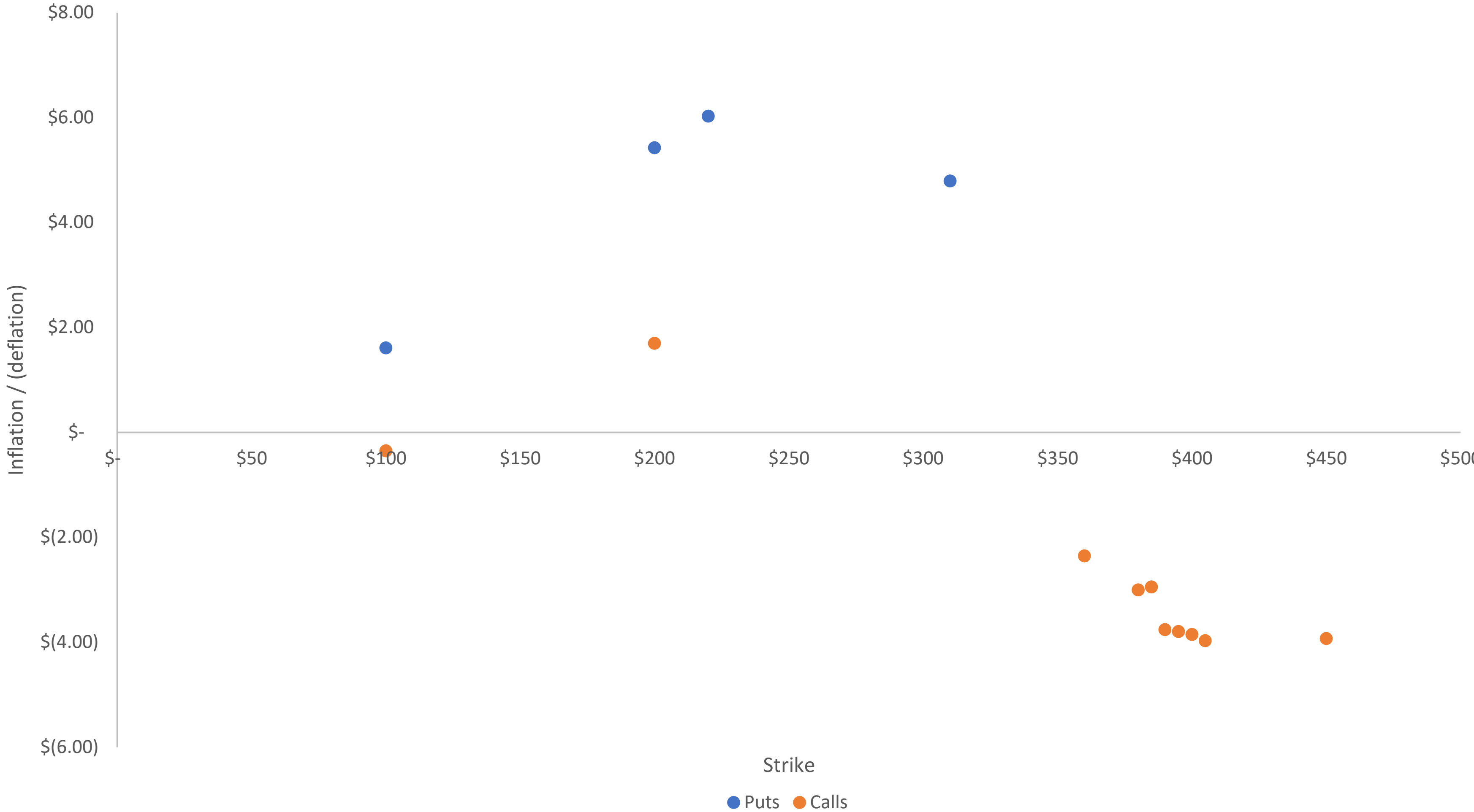
Strike	Actual Transacted Price	But-For Option Price	Inflation
$100	$1.61	$0.00	$1.61
$200	$6.67	$1.25	$5.42
$220	$8.65	$2.63	$6.02
$310	$27.50	$22.71	$4.79

Sources: CBOE Data.

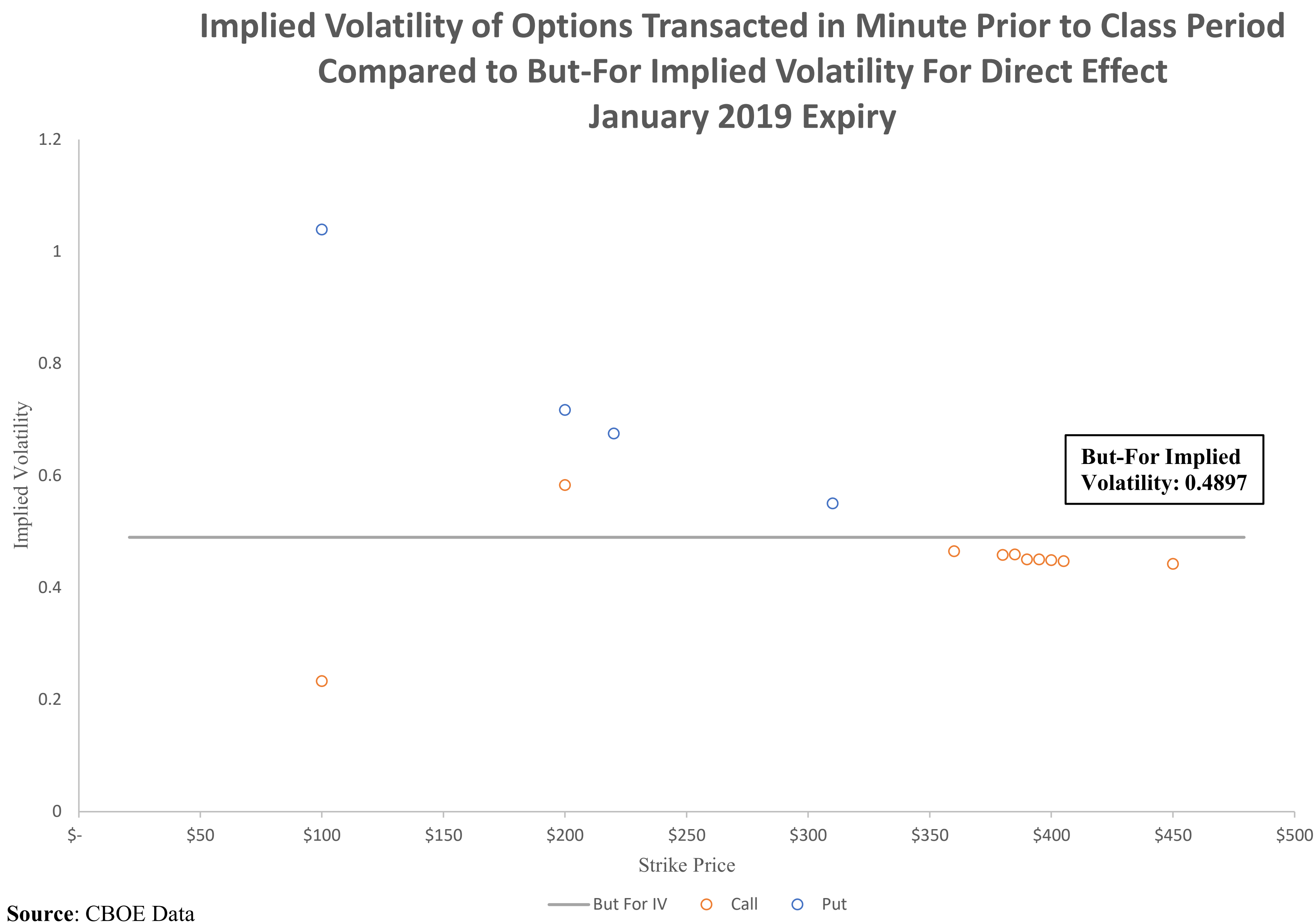
Notes:

1. Actual Transacted Price is assumed to be based on the "Close" price in CBOE data at 12:47pm on August 7, 2018.
2. But-For Option Price is calculated using the Black-Scholes-Merton (BSM) option pricing formula using the price of Tesla stock at 12:47pm on August 7, 2018 and a But-For Implied Volatility of 48.97% (see Hartzmark Appendix 8).

Inflation Estimates Related to Direct Effect of Tweet Are Not Zero for Transactions Occurring in Minute Prior to Start of Class Period
January 2019 Expiry



Sources: CBOE Data
Notes: Inflation or Deflation is calculated as the difference between the actual transacted price as of 12:47pm on August 7, 2018 and the But-For Price calculated with the Black-Scholes model, using Hartzmark's But-For Implied Volatility related to Direct Effect as an input.



Source: CBOE Data

Notes: The Black-Scholes Implied Volatility is calculated based on close price at 12:47pm on August 7, 2018. This Implied Volatility is compared to the But-For Implied Volatility for the Direct Effect of the Tweet.

Exhibit C

Inflation Estimates Are Not Zero for Transactions in the Last Minute of the Class Period
Call Options with October 2018 Expiry

Strike	Actual Transacted Price	But-For Option Price	Inflation
$240	$76.00	$71.45	$4.55
$325	$19.02	$21.64	-$2.62
$335	$14.92	$18.30	-$3.38
$340	$13.14	$16.80	-$3.66
$350	$10.15	$14.11	-$3.96
$355	$8.65	$12.91	-$4.26
$370	$5.48	$9.83	-$4.35
$375	$4.70	$8.96	-$4.26
$380	$3.99	$8.15	-$4.16
$420	$1.00	$3.73	-$2.73

Sources: CBOE Data.
Notes:
1. Actual Transacted Price is assumed to be based on the "Close" price in CBOE data at 4pm on August 17, 2018.
2. But-For Option Price is calculated using the Black-Scholes-Merton (BSM) option pricing formula using Tesla Stock Price at market close on August 17, 2018 and a But-For Implied Volatility of 57.54% (see Hartzmark Appendix 8).

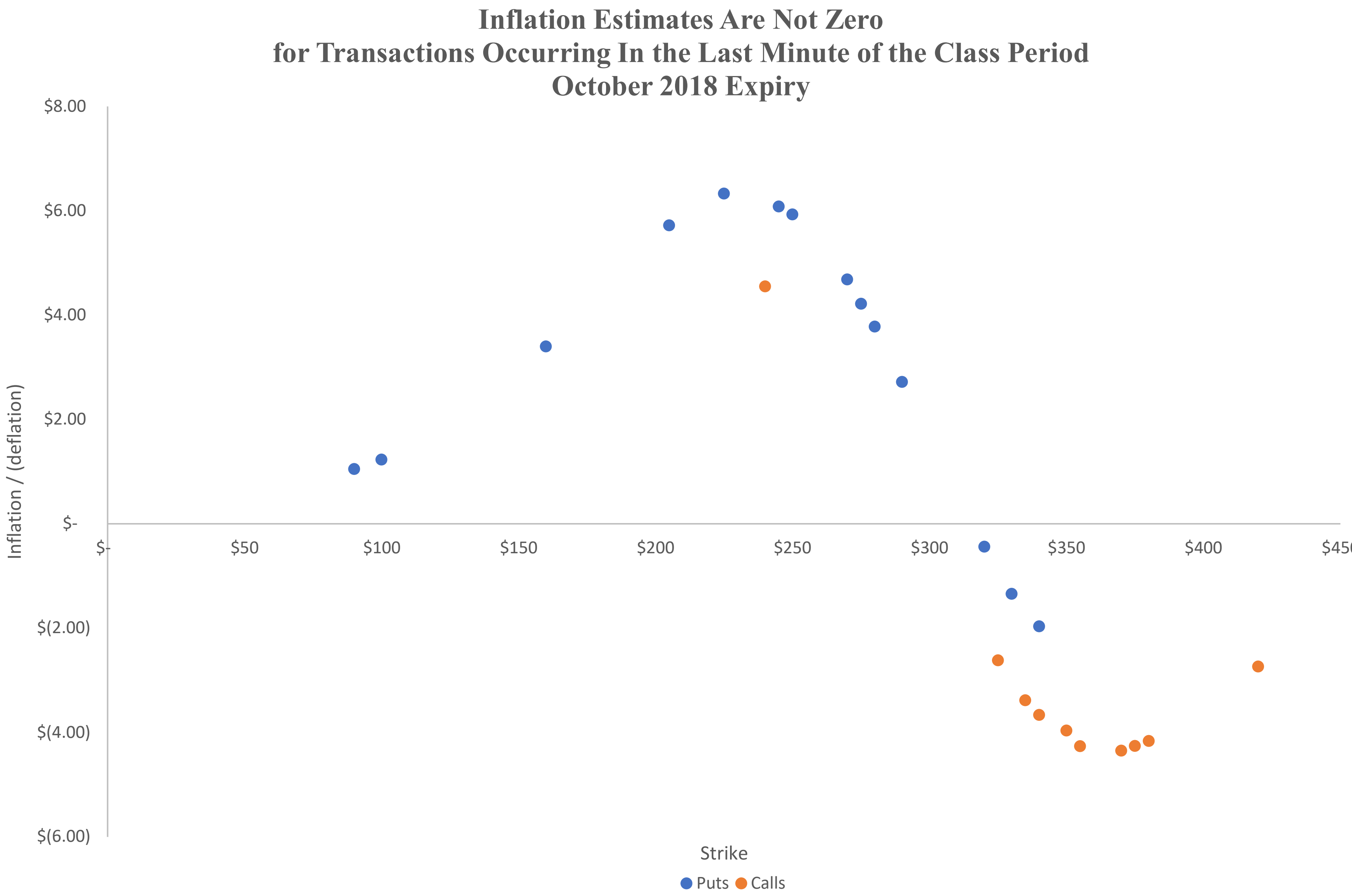
Inflation Estimates Are Not Zero for Transactions in the Last Minute of the Class Period
Put Options with October 2018 Expiry

Strike	Actual Transacted Price	But-For Option Price	Inflation
$90	$1.05	$0.00	$1.05
$100	$1.23	$0.00	$1.23
$160	$3.45	$0.05	$3.40
$205	$6.85	$1.13	$5.72
$225	$9.20	$2.87	$6.33
$245	$12.17	$6.09	$6.08
$250	$13.11	$7.18	$5.93
$270	$17.54	$12.86	$4.68
$275	$18.84	$14.62	$4.22
$280	$20.31	$16.53	$3.78
$290	$23.50	$20.78	$2.72
$320	$36.43	$36.87	-$0.44
$330	$41.92	$43.26	-$1.34
$340	$48.15	$50.12	-$1.97

Sources: CBOE Data.

Notes:

1. Actual Transacted Price is assumed to be based on the "Close" price in CBOE data at 4pm on August 17, 2018.
2. But-For Option Price is calculated using the Black-Scholes-Merton (BSM) option pricing formula using Tesla Stock Price at market close on 8/17/2018 and a But-For Implied Volatility of 57.54% (see Hartzmark Appendix 8).



Sources: CBOE Data

Notes: Inflation or Deflation is calculated as the difference between the actual transacted price as of 4pm on August 17, 2018, and the But-For Price is calculated with the Black-Scholes model, using Hartzmark's But-For Implied Volatility as an input.

Source: CBOE Data

Notes: The Black-Scholes Implied Volatility is calculated based on close price at 4:00pm on August 17, 2018. This Implied Volatility is compared to the But-For Implied Volatility.